29. (Canceled)

30. (Canceled)

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on June 10, 2002, and the documents cited therewith.

Claims 18 and 19 are amended, claims 20-30 are canceled. As a result, claims 1-19 are now pending in this application.

Affirmation of Election

Restriction to one of the following claims was required:

As provisionally elected by Applicant's representative, Bradley Forrest, on May 22, 2002, Applicant elects to prosecute the invention of Group I claims 1-19.

The claims of the non-elected invention, claims 20-30, are hereby canceled. However, Applicant reserves the right to later file continuations or divisions having claims directed to the non-elected inventions.

Claim Objections

Claims 18 and 19 were objected to due to an informality. It is believed that the amendments made herein to claims 18 and 19 obviate these objections.

§102 Rejection of the Claims

Claim1 was rejected under 35 USC § 102(e) as being anticipated by Grudkowski (U.S. 5,309,004). This rejection is respectfully traversed on the grounds that Grudkowski does not show each an every element of the claimed invention.

Claim 1 recites a "heterojunction field effect transistor", and "applying AlN to the top surface". Grudkowski does not describe a heterojunction field effect transistor. It references an accoustic charge transport device (Col. 2, lines 33-35) which operates quite differently from a transistor. No description of any type of transistor, such as references to "transistor", "gate" or "drain" has been found. As referenced in the present application at least at page 3, lines 3-6, the modified transistors are used in applications generally dealing with higher power levels. Grudkowski's structure deals with inherently lower power devices, such as "high speed analog signal processors." Col. 1 lines 34-35. Since Grudkowski does not show each and every element of the claim, the rejection should be withdrawn.

Claims 11 and 13 were also rejected under 35 USC § 102(e) as being anticipated by Temkin et al. (U.S. 6,391,748). This rejection is respectfully traversed. Temkin et al. discusses that "Aluminum nitride, AlN, layers are grown on silicon substrates using molecular beam epitaxial (MBE) growth." Abstract. Temkin et al. does not describe the use of plasma RF nitrogen as claimed in claim 11. One advantage inherent in the invention of claims 11 and 13 is that it can be performed at a low enough temperature to be compatible with the formation of FETs or other low thermal budget devices. Temkin et al. requires a higher temperature, as ammonia will not dissociate at low temperatures.

§103 Rejection of the Claims

Claims 12 and 14-19 were rejected under 35 USC § 103(a) as being unpatentable over Temkin et al. This rejection is respectfully traversed. As referenced above, Temkin et al. does not teach or describe the use of plasma RF nitrogen as claimed. Since each element of independent claims 11 and 17, and by dependency, claims 12, 14-16 and 18-19, is neither taught nor suggested by Temkin et al., the rejection should be withdrawn.

Claims 1-10 were also rejected under 35 USC § 103(a) as being unpatentable over Temkin et al. in view of Grudkowski. This rejection is respectfully traversed. As indicated above, Grudkowski does not teach or describe applying an AlN layer to the top surface of a heterojunction field effect transistor as maintained in the Office Action. A word search of Grudkowski reveals no use of the words "transistor" "source", "drain" or "gate". An accoustic

charge transport device is not a field effect transistor, and operates in quite a different manner.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. No prima facie case of anticipation nor obviousness has been established because each claim has at least one element not shown or suggested by the references or combination of references. The Examiner is invited to telephone Applicant's attorney ((612) 373-6972) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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By their Representatives,

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Date 9-10-2002 By _____
Bradley A. Forrest
Reg. No. 30,837

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 10th day of September, 2002.

Anne M. Richards
Name

_____
Signature

CLEAN VERSION OF AMENDED SPECIFICATION PARAGRAPHS

AIN COATED HETEROJUNCTION FIELD EFFECT TRANSISTOR AND METHOD OF FORMING AN AIN COATING
Applicant: William J. Schaff et al.
Serial No.: 09/858,337

Amended paragraph beginning at page 2, line 7:

A'

There is a need for increasing the power output of HFETs. Prior attempts include using a layer of Si_3N_4 over the surface of an already formed HFET. While this improved the power output of the HFET, it required different equipment than was used to form the HFET. Further, controlling the ratios of the deposition required careful calibration and it was difficult to obtain consistent results.

Docket No. 1153.048US1 Client Reference No. D2741
WD #4615871

CLEAN VERSION OF PENDING CLAIMS

AlN COATED HETEROJUNCTION FIELD EFFECT TRANSISTOR AND METHOD OF FORMING AN AIN COATING
Applicant: William J. Schaff et al.
Serial No.: 09/858,337

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1. A method of forming a field effect transistor, the method comprising:
forming a channel heterojunction field effect transistor having a top surface; and
applying AlN to the top surface of the heterojunction channel field effect transistor.

2. The method of claim 1 wherein the thickness of the AlN layer is between approximately 500 and 2000 Angstrom.

3. The method of claim 1 wherein Al and N are applied alternately until a desired thickness of AlN is obtained.

4. The method of claim 1 wherein a predetermined amount of time occurs between each alternate application.

5. A method of forming a field effect transistor, the method comprising:
forming a heterojunction channel field effect transistor having a top surface; and
applying AlN to the top surface of the heterojunction channel field effect transistor using molecular beam epitaxy.

6. The method of claim 5 wherein the beams are alternately applied for approximately two seconds until the desired thickness is obtained.

7. The method of claim 5 and further comprising delaying a predermined amount of time between the alternating beams.

8. The method of claim 7 wherein the beams are alternately applied for approximately two seconds, and the delay is also approximately two seconds between the alternating beams until the desired thickness is obtained.

9. The method of claim 5 wherein the desired thickness is approximately 500 Angstrom.

10. The method of claim 5 wherein the beams are applied at approximately 150 degrees Celsius.

11. A method of forming a layer of AlN of desired thickness on a semiconductor substrate, the method comprising:

using molecular beam epitaxy:

applying beams of Al; and

applying beams of remote plasma RF nitrogen alternately with the beams of AL to produce the layer of AlN of desired thickness.

12. The method of claim 11 wherein the beams are alternately applied for approximately two seconds until the desired thickness is obtained.

13. The method of claim 11 and further comprising delaying a predermined amount of time between the alternating beams.

14. The method of claim 13 wherein the beams are alternately applied for approximately two seconds, and the delay is also approximately two seconds between the alternating beams until the desired thickness is obtained.

15. The method of claim 11 wherein the desired thickness is approximately 500 Angstrom.

16. The method of claim 11 wherein the beams are applied at approximately 150 degrees Celsius.

17. A method of forming a layer of AlN of desired thickness on a semiconductor substrate, the method comprising:

using molecular beam epitaxy at a temperature less than approximately 300 degrees Celsius:

applying a beam of Al;

waiting a predetermined period;

applying a beam of remote plasma RF nitrogen;

waiting a predetermined period; and

repeating application of the beams and waiting periods to produce the layer of AlN of desired thickness.

18. (Amended) The method of claim 17 wherein the desired thickness of AlN is approximately 500 Angstrom.

19. (Amended) The method of claim 17 wherein the beams last approximately two seconds each application, and the waiting periods are approximately two seconds.

20. (Canceled)

21. (Canceled)

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)

30. (Canceled)